MN3006

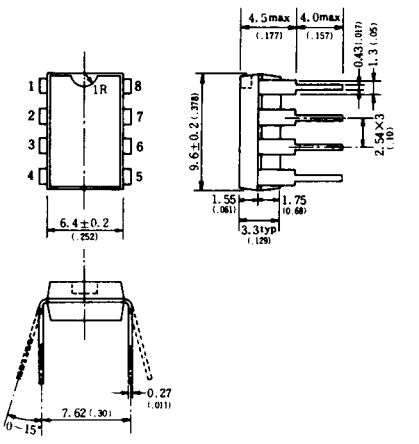
128-STAGE ECONOMY TYPE BBD

■ General description

The MN3006 is a 128-stage BBD with wide dynamic range and low distortion manufactured by using P-channel low noise silicon gate process.

The MN3006 is designed to obtain variable range of delay time from 0.32 to 6.4ms suitably applied for tolemoro and vibrato effects in electronic musical instruments. Compact 8 lead dual-in-line plastic package.

Unit: mm (inch)



8-Lead Dual-In-Line Plastic Package

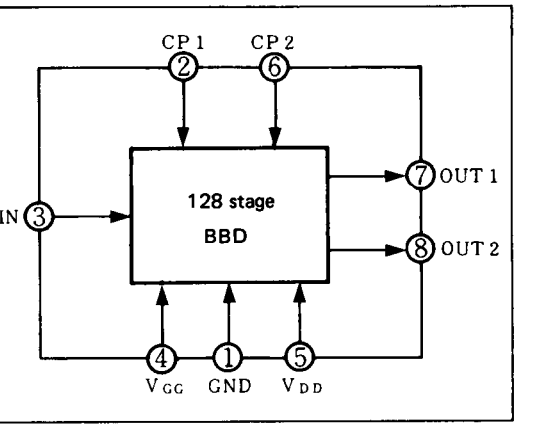
■ Features

- Variable delay time of audio signal: 0.32 ~ 6.4ms.
- No insertion loss: L_i = –dB typ.
- Wide dynamic range: S/N ≃ 90dB typ.
- Wide frequency response: $f_i \leqq$ 12KHz.
- Low distortion: THD = 0.2% typ.
- Low noise: V_{no} = 0.2mVrms max.
- P channel low noise silicon gate process.
- Compact 8 lead dual-in-line plastic package.

■ Applications

- Vibrato and chorus effects in electronic musical instruments.
- Reveberation effect in electronic musical instruments.
- Variable or fixed delay of analog signals.

■ Block Diagram



■ Quick Reference Data

Item	Symbol	Value	Unit
Supply Voltage	V_{DD}, V_{GG}	–15, V_{DD} + 1	V
Signal Delay Time	t_D	0.32~6.4	ms
Total Harmonic Distortion	THD	0.2	%
Signal to Noise Ratio	S/N	90	dB

■ Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Rating	Unit
Terminal Voltage	V_{DD}, V_{GG}, V_{CP}, V_I	−18~+0.3	V
Output Voltage	V_O	−18~+0.3	V
Operating Temperature	Topr	−20~+60	°C
Storage Temperature	Tstg	−55~+125	°C

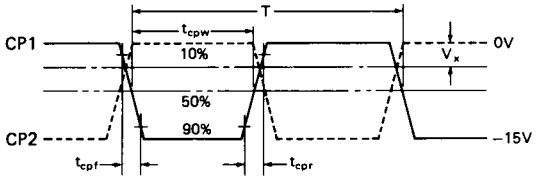
■ Operating Conditions (Ta = 25°C)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain Supply Voltage	V_{DD}		−14	−15	−16	V
Gate Supply Voltage	V_{GG}			$V_{DD}+1$		V
Clock Voltage "H" Level	V_{CPH}		0		−1	V
Clock Voltage "L" Level	V_{CPL}			V_{DD}		V
Clock Input Capacitance	C_{CP}				100	pF
Clock Frequency	f_{CP}		10		200	kHz
Clock Pulse Width *2	t_{cpw}				0.5T*2	
Clock Rise Time *2	t_{cpr}				500	ns
Clock Fall Time *2	t_{cpf}				500	ns
Clock Cross Point	V_X		0		−3	V
Input DC Bias	V_{Bias}		−5		−10	V

■ Electrical Characteristics (Ta = 25°C, V_{DD} = V_{CPL} = −15V, V_{CPH} = 0V, V_{GG} = −14V, R_L = 100kΩ)

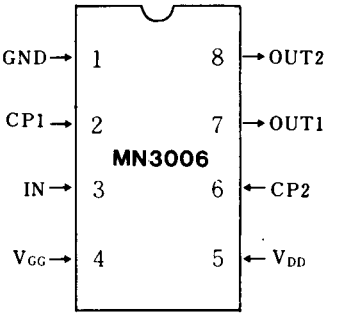
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Signal Delay Time	t_D		0.32		6.4	ms
Input Signal Frequency	f_i	f_{CP} = 40kHz, V_i = 1.8Vrms, 3dB down (0dB at f_i = 1kHz)	12			kHz
Input Signal Swing	V_i	f_{CP} =40kHz, f_i = 1 kHz, THD=2.5%	1.8			Vrms
Insertion Loss	L_i	f_{CP} =40kHz, f_i = 1 kHz, V_i =1.8Vrms	−4	0	4	dB
Total Harmonic Distortion	THD	f_{CP}=40kHz, f_i = 1 kHz, V_i =0.78Vrms		0.2	2.5	%
Noise Voltage	V_{no}	f_{CP} = 100kHz, Weighted by "A" curve		0.08	0.2	mVrms
Signal to Noise Ratio	S/N	Maximum output voltage to noise voltage		90		dB

*1 Clock Pulse Waveforms



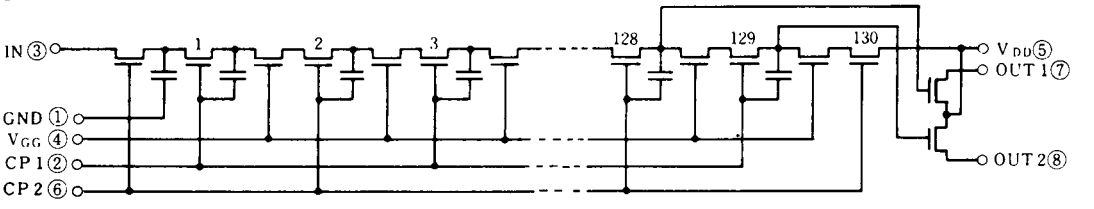
*2 T = 1/fcp (Clock period)

■ Terminal Assignments



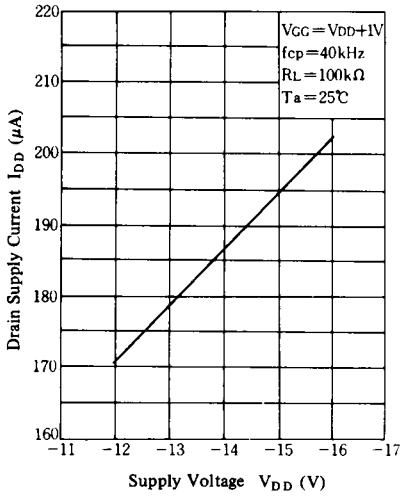
(Top View)

■ Circuit Diagram

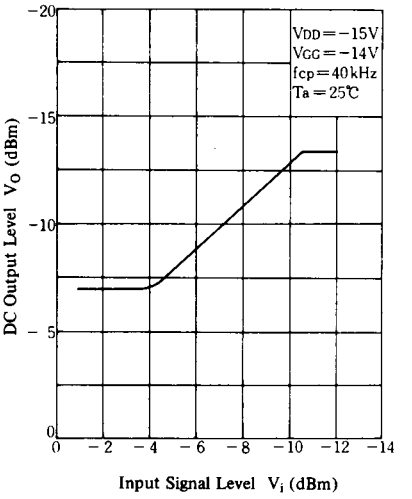


■ Typical Electrical Characteristic Curves

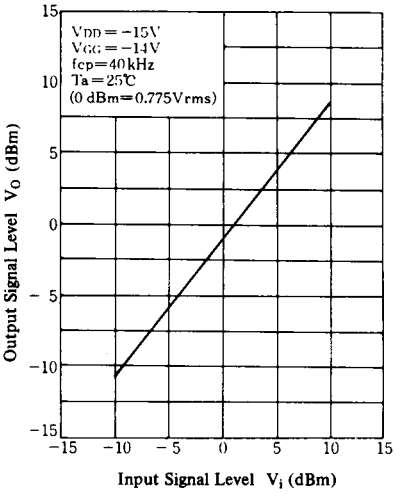
$I_{DD}-V_{DD}$



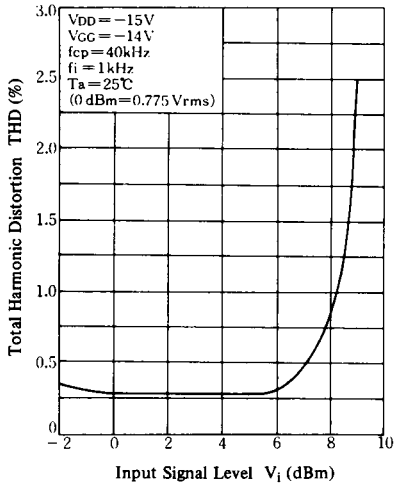
V_O-V_I



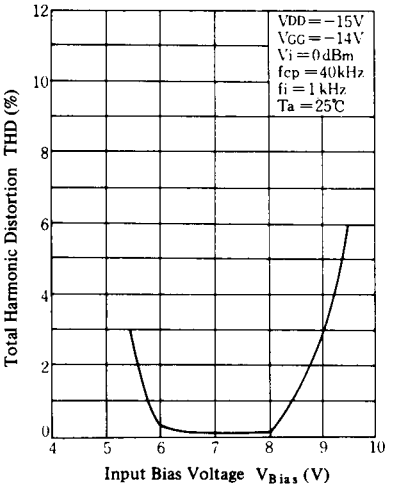
V_o-V_i



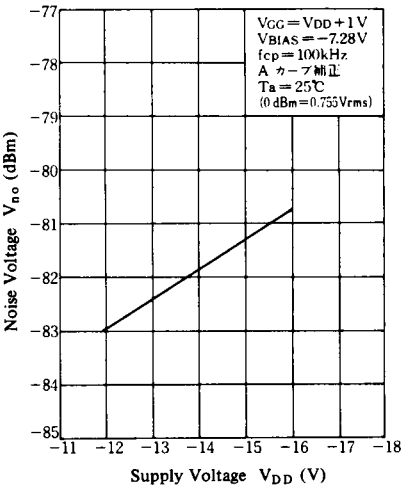
THD−Vi



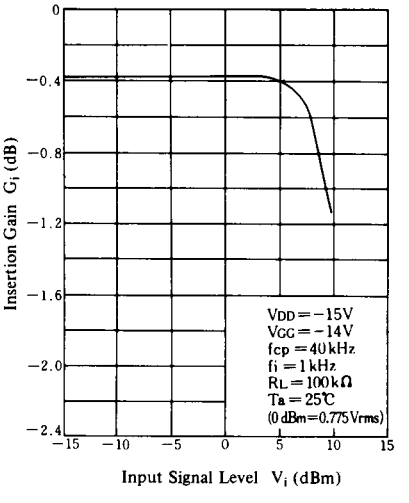
$THD-V_{Bias}$



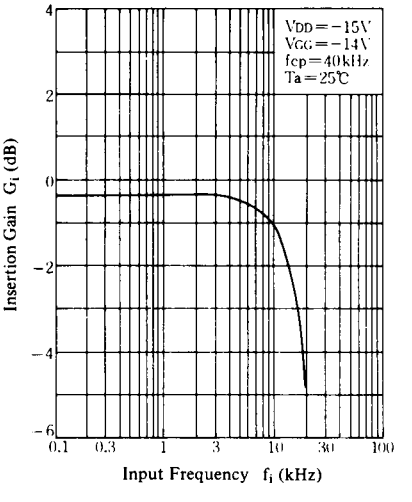
$V_{no}-V_{DD}$



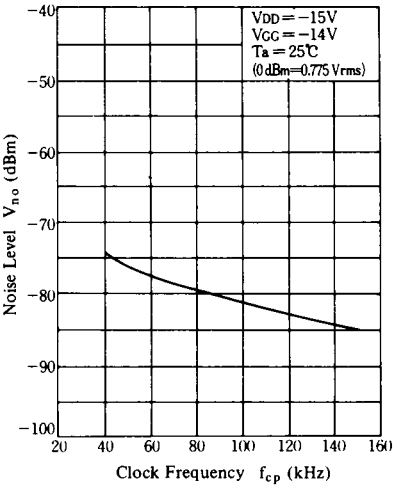
G_i-V_i



G_i-f_i

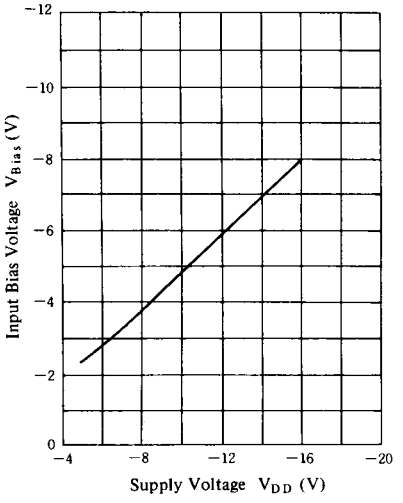


$V_{no}-f_{cp}$

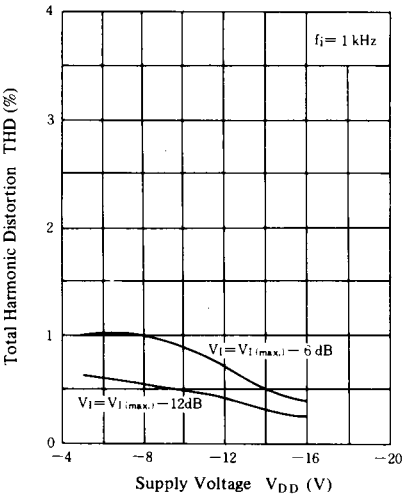


■ Supply Voltage Characteristics

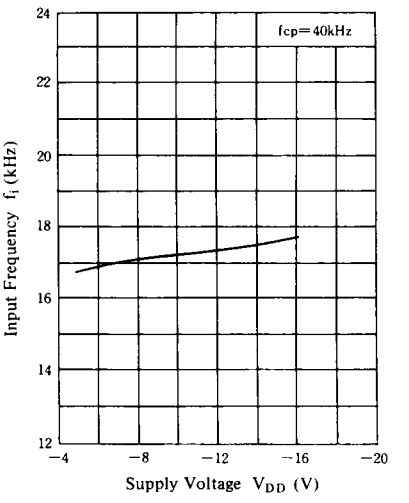
V_{Bias}—V_{DD}



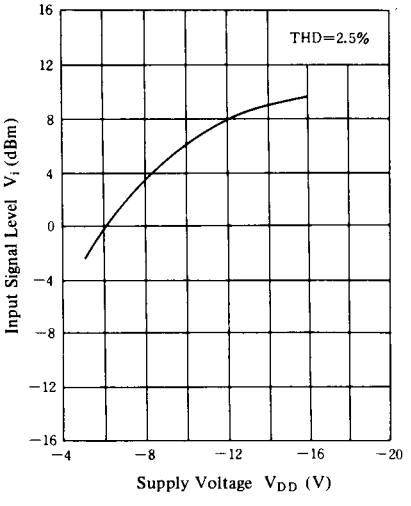
THD—V_{DD}



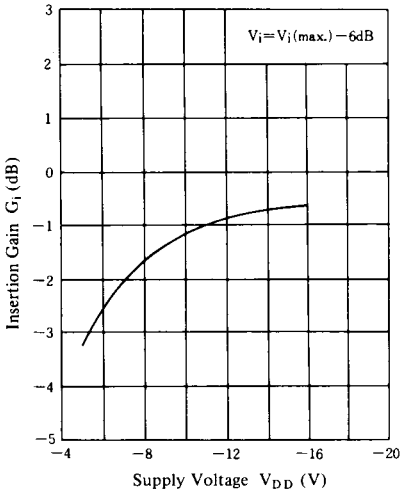
f_i—V_{DD}



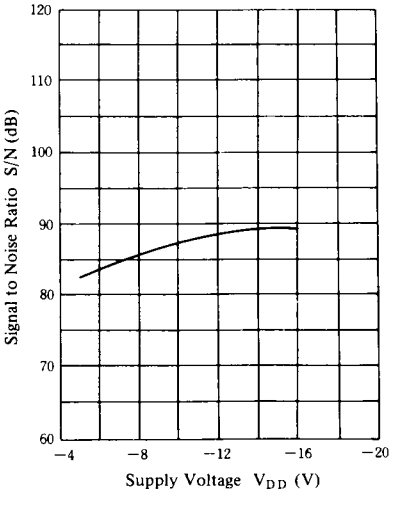
V_i—V_{DD}



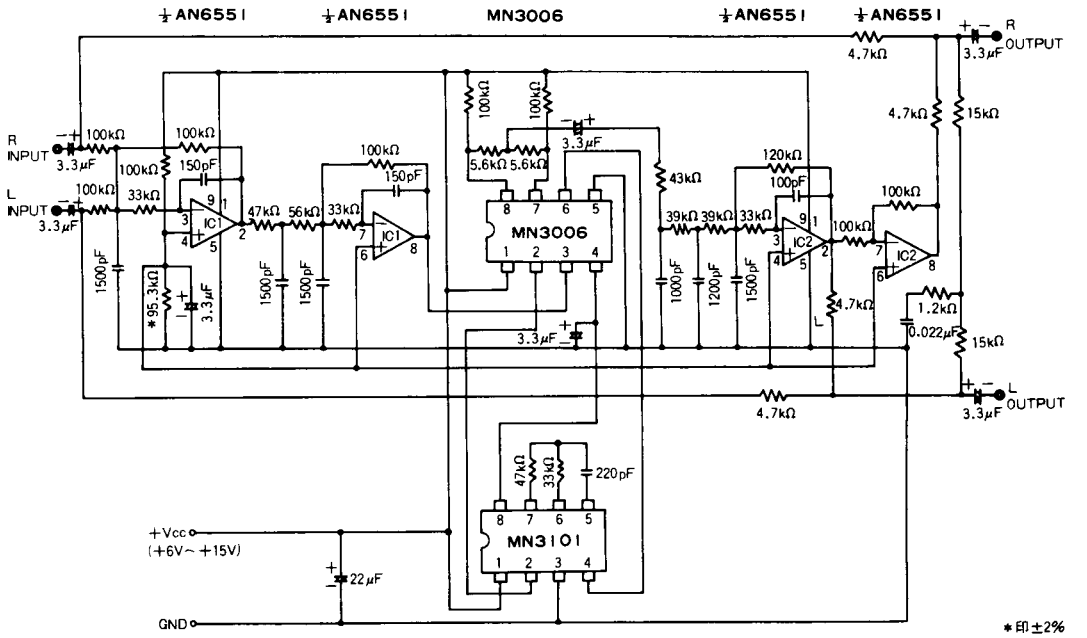
G_i—V_{DD}



S/N—V_{DD}



■ Example of application circuit



Sount field magnifying effect generating circuit

Sound field magnifying effect generating circuit

Isn't it really wonderful if the speaker reproduction of sound for a grand hall can be got in the listening room or the car? Application of the sound image control technology and the delay characteristic of the BBD makes it possible to realize the above effect easily.

In listening through a speaker in the room, the listener feels the distance and direction up to the speaker. As to the directional sense, for instance, there occurs some difference in the time for both direct and indirect sounds to reach his left and right ears depending on the position of the sound source, as well as the difference in the sound level, and from these differences the listener feels the "direction of sound". Further he feels the "distance of sound" from the energy ratio of the direct sound to the indirect sound (reverberation sound). The circuit for generating a sound field magnifying effect reproduces electronically the delicate time lag of these sounds, thereby makes it possible for the listener to feel as if he hears sounds from his surroundings other than the position of the speaker, and thus producing such effect that he is listening sounds in a large hall. Also the fatigue from listening for a long time through a conventional headphone is eliminated, and the effect similar to that of listening through an ordinary speaker is obtained.